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many years' duration. If associations of the kind be indispensable to the classes from which Friendly Societies are constituted, it would be well to base them on the most simple principles, leaving more serious arrangements to be dealt with by more stable bodies. An annual subscription, to be expended upon the sickness of the year, or to be divided amongst the survivors at the end of it, might be to a certain extent beneficial, and might serve for the cultivation of a friendly understanding, and for the promotion of mutual good offices; whilst any loss of moment, or disappointment of consequence, would be out of the question. - All experience seems to prove that a high order of intelligence, and integrity strengthened by a somewhat conspicuous position, are alone fitted to administer successfully affairs of the kind in question; and that the interests of the labouring population would be more secure and better cared for in the hands of the Savings' Banks and well established Assurance Companies than in their own.—ED. A. M.

On the Influence of the Ages of the Parents at the time of Marriage on the Sex of Children, and on the Prolificness of Marriages.
By SAMUEL BROWN, F.S.S., one of the Honorary Secretaries of the Institute of Actuaries, and Actuary of the Mutual Life Assurance Society.

IN the course of the inquiries which led to the paper, read before the Institute of Actuaries, and published in the last number of the *Assurance Magazine*, on "the Uniform Action of the Human Will," which was principally illustrated by the regularity in the proportion of marriages between different classes and at different ages, I was very much struck by the law which appears to regulate the relative proportion of the sexes at birth. It has long been observed that, in all countries in which the law of population is not unusually disturbed, more males are born than females. This is the result, not of a few isolated observations, but of more than seventy millions of facts, collected from authentic sources in different kingdoms, and for many succeeding years. The proportion varies from nearly 109 males to 100 females in Russia, down to 104·62 males to 100 females in Sweden; Great Britain occupying the last place but one, about 104·75 to 100. The average births for all Europe may be taken as 106 males to 100 females. The

reflection requires not to be forced upon us, that this is one of those wise and beneficent provisions of Providence, by which, in after years, the relative proportion of the sexes, so essential to the preservation and increase of a population, is maintained. The life of man is exposed to many more destructive influences than that of woman. Even before birth it appears as if males were less capable of coming to maturity. MM. Quetelet and Casper remark, that in Flanders and in Berlin the proportion of still-born males to females was, in both sets of observations, as 14 to 10. In infancy the perils of life to males are greater. In England, only 674 males out of 1000 reach the age of fifteen years, when 700 females survive to that age. In later years man suffers from the unhealthy occupations in which he may be engaged, from the toils and anxieties of business, from the risks of foreign climate, and the dangers of war. If all these circumstances were acting on the male sex only, in a population in which males and females were born in equal numbers, it is evident that the balance of the sexes would be destroyed. The law of nature which provides for the continuance and increase of a population by marriage would be checked, and the population would necessarily decrease, because in each generation there would be a greater disparity in the number of each sex, and consequently a smaller number of marriages. The greater number of the male births tends to restore the necessary equality of sexes, and provides for the continuance of the species. In four enumerations of the population of Sweden, given in the Registrar-General's Sixth Report, the males and females between the ages of 10 and 15 were—

YEAR.	Males.	Females.	Difference in excess.
1805	121,946	120,767	1,179 Males.
1810	120,157	120,295	138 Females.
1820	130,351	131,518	1,167 Females.
1830	170,878	169,870	1,008 Males.
	543,332	542,450	882 Males.

so that on the average of these four different periods there was a difference of the sexes of only 16 in 10,000 males.

In 1835, in the towns of Norway there were existing, between the ages of 10 and 20, 12,799 males and 12,439 females; and in all the country, 123,823 males to 120,299 females, the disproportion—

tion in numbers previous to these ages being in favour of the males, and afterwards on the side of the females. If the ages 10 to 15 only be taken, they would appear to be very nearly alike. Several other instances might be quoted, but these will suffice to prove the fact of a near approach to equality of the sexes about the age of puberty.

M. Hofacker appears to have been the first to draw any general conclusions from the researches which he made into the influence of the age of parents on male and female births, and, in a paper published in the *Annales d'Hygiène* for 1829, stated the result of his inquiries to be that, when the mother was older than or of equal age with the father, more girls were born than boys; but the greater the difference of age on the side of the father, the more the number of male children predominated. The following table is the summary from which these deductions are drawn. M. Quetelet, however, suggests that he has not been sufficiently precise as to the source or authenticity of his data.

TABLE I.—*Showing, by M. Hofacker's observations, the proportion of Male to Female Births when the husband is older or younger than his wife.*

Age of the Husband.	Age of the Wife.	Proportion of Males to 100 Female births.
Younger than his wife	.. ..	90·6
Same age	.. ..	90
Older by 3 to 6 years	.. ..	103·4
" 6 to 9 "	.. ..	124·7
" 9 to 18 "	.. ..	143·7
" 18 and upwards	.. ..	200
24 to 36 years	16 to 26	116·6
"	36 to 46	95·4
36 to 48 "	Young	176·9
"	Middle aged	114·3
"	Older	109·2
48 to 60 "	Middle aged	190
"	Older	164·3

But Mr. Sadler, in his *Law of Population*, published in 1830, pursuing the same subject, has been at considerable pains to collect such original data as bore upon it, and with great labour compiled a set of tables, by which much curious information is elicited. It must be borne in mind that his work is written avowedly to expose the errors of Malthus; and he attacks with great bitterness and energy what is called the "preventive check" system. The anti-populationists maintain that early marriages are most conducive to human prolificness;

and, believing that such increase may be much beyond the rate of increase in the production of food, they discourage such unions, as tending to poverty and misery. Sadler, on the other hand, maintains that later marriages are more fruitful in proportion to the time they are deferred, and that the attempt, therefore, to oppose the order of nature, is met by a counteracting law, which restores the average prolificness of marriages, and maintains the rate of increase of the population. If the "preventive check" defers the average period at which marriages take place, the period of female prolificness is lengthened in proportion; and still further, as a succession of early marriages would bring generations closer together, and thus lead to a too rapid increase of population, the evil is corrected by another law of nature, which renders early marriages not only less fruitful than later ones, but provides that the children of such marriages should die at early ages in greater proportions than children born of later marriages. The former, therefore, though more productive, do not permanently add to the population more than the latter. Admitting his facts, and all these conclusions to be deduced correctly from them, it does not appear to me that the argument is strong against the opponent system, but rather the contrary. The whole object of the Malthusian system seems to be, that men should not marry till they had, either in possession or prospect, some means of maintaining an increasing family, not rendering them a burden to the community, but making them what an increase of population in olden times was always considered to be—the strength and blessing of a country. If later marriages on the part of both parents would have this effect, and do not, as Mr. Sadler contends they do not, diminish the ratio of increase, his reasonings bear surely as much in favour of the "preventive check" as against it.

In very remote periods we find, as in many of our social questions of the day, evidence that the discoveries which we think new were known to the ancients, though we have no record of the facts from which their conclusions were drawn. Aristotle considered early marriages injurious to the procreation of children, and dangerous to the mother. "Many," he says, "suffer greatly, and many die in childbirth." Lycurgus, though he strove to promote marriages and to render celibacy disgraceful, yet provided that women should not marry till they had attained the full vigour of their age.

To prove that the fecundity of marriage increases as the period of union is postponed, the following interesting table may be

quoted from Sadler, as calculated from data furnished by Dr. Granville regarding 876 cases of parturition which he attended as Physician to the Benevolent Lying-in Institution and the Westminster Dispensary. In the second column is shown the number of births which occurred on an average to each year of marriage, according to the age of the mother when contracted; and the last column shows the proportion of mortality amongst these births to the date of the existing pregnancy.

TABLE II.—*Showing, from Dr. Granville's cases, the proportion of Births for each Year of Marriage, according to the Age of the Mother, and the proportion of Mortality to each Birth.*

Age when Married.	Average Number of Births for each Year of Marriage.	Effect on the Mortality of Children.			Children to each Marriage.
		Number of Marriages.	Number of Living Births.	Proportion of Mortality to each Birth.	
13 to 16	·457	74	376	·444	5·08
16 „ 20	·504	354	1,307	·425	3·70
21 „ 24	·520	283	823	·424	2·91
25 „ 28	·545	110	287	·407	2·61
29 „ 32	·590	38	67	·313	2·03
33 „ 36	·777				
37 „ 39	1·125				

The last column has been computed by M. Quetelet, and shows that though the annual fecundity is less, the fruitful wives who were married early have produced the most children.

It must be remarked, that the mortality of children appears to be taken to the date of observation; and as a greater number of years would have elapsed from the earliest marriages than from the later ones, these observations are not sufficiently conclusive for any general law.

In connection with this subject, and for the same class of results, a very interesting and elaborate Report may be referred to (in the eleventh volume of the *Journal of the Statistical Society*, page 193), of “An Investigation into the State of the Poorer Classes of St. George’s-in-the-East, in the early part of 1845.” In 1488 cases the ages of the fathers and mothers are given at the date of their first child; and if we may suppose the marriages to have taken place one year earlier, the percentages may be compared with the Table for all England, given in my last paper.

TABLE III.—*Showing the proportion of Marriages, at different Ages, of the Poorer Classes in St. George's-in-the-East.*

Age of Marriage.	Proportion per cent.		Proportion per cent., England.	
	Males.	Females.	Males.	Females.
Under 20	11·43	30·98	2·35	11·45
20 to 30	73·59	64·45	89·96	83·38
30 „ 40	12·90	4·30		
40 & upw ^{ds}	2·08	·27	7·69	5·17
	100·	100·	100·	100·

We shall be considering, therefore, cases of remarkably early marriages when compared with the general average of England.

TABLE IV.—*Showing the average Number of Children and the average Mortality per cent. of Births to each Marriage.*

Years elapsed since Birth of First Child.	Marriages formed at Ages of Mother.								Total Ages, 14 to 43.	
	16 to 20.		21 to 25.		26 to 30.		31 to 35.			
	Born.	Mort. per cent.	Born.	Mort. per cent.	Born.	Mort. per cent.	Born.	Mort. per cent.	Born.	Mort. per cent.
10	5·05	36·87	4·51	37·09	4·42	37·89	3·44	35·48	4·62	37·18
20	7·68	47·44	7·01	43·10	6·43	44·36	3·00	16·67	6·87	44·16
30	8·41	53·03	7·89	43·89	6·80	48·53	7·00	64·29	7·86	48·11
40	10·85	63·12	8·24	57·14	5·00	68·	4·00	50·	8·17	61·19
50	12·80	75·01	5·00	70·	3·50	28·57	..	..	9·00	70·37
60	14·90	71·43	..	..	..	..	..	..	14·00	71·43
Total average	6·07	46·11	5·15	41·07	4·87	39·61	3·94	37·56	5·33	42·54

It may be noticed that though the mortality per cent. agrees in some degree with Dr. Granville's statement, yet the general average of these results is contrary to those deduced by Mr. Sadler from the peerage of England, it appearing that the earlier the age of marriage the greater the number of children born to each marriage. The effect of mortality on the children of these marriages will be found in the second parallel column under each age. The children born of marriages in which the mothers at that date were 21 to 25 years of age, are subject to a less rate of mortality than at ages either immediately preceding or following. At age 31 and upwards, the facts are too few to admit of any accurate deduction. An important point of the inquiry is as to the actual increase of population arising from this ratio of deaths to births at different intervals, and it appears from this table that marriages formed under 25 years of age increase the population more than

those formed above that age. The rate of increase is somewhat higher at the younger ages, but not sufficiently so to affect the results materially. The number of families is 1506; the number of births, 8034; of which 4616 children, or 57·46 per cent., are still alive. The principal defect of these observations is that unfruitful marriages are not included in these 1506 families, nor the marriages in which, though fruitful, both of the parents had died before the lapse of years brought under review. It must also be remarked, that as so large a proportion of children still survive, the result might at later dates be very different as to the ratio of mortality noticed. Lastly, they are classified only according to the age of the mother at the birth of her first child. They can scarcely, therefore, disturb the results of Mr. Sadler's more complete tables, to which we now turn.

The following may be briefly stated as the general conclusions arrived at:—

That the proportion in which the sexes are born is governed and regulated by the difference in the ages of the parents in such manner, that on the average, among the total of the births, the sex of that parent shall exceed in number in proportion as the age exceeds; and still further, that that excess shall correspond to the mortality which would take place in a period equal in duration to the interval between the ages of the parents; preserving therefore the balance of the sexes at the usual age at which they marry.

The principal data to which Mr. Sadler appeals for his various conclusions are derived from a careful analysis of the peerage of England; and to prove that the number of children does not depend upon the ages of the parents taken separately, the following table is given:—

TABLE V.—*Showing the proportion of Males born to Females in the Marriages of 1027 Peers and 471 Peeresses, being the total Number whose Ages could be ascertained at the date of Marriage.*

Ages.	Peers.		Peeresses.	
	Number of Marriages.	Proportion of Male to 1,000 Female Births.	Number of Marriages.	Proportion of Male to 1,000 Female Births.
Under 16 }			{ 13	1,121
16 to 21 }	54	1,153	{ 177	1,299
21 " 26	307	938	191	1,055
26 " 31	284	1,143	60	1,250
31 " 36	137	1,133	21	1,110
36 " 41	90	987	9	1,000
41 " 46	58	1,120	..	..
46 " 51	51	952	..	..
51 " 56	19	1,363	..	..
56 " 61	11	2,000	..	..
61 " 66	12	750	..	..
66 & upw ^{ds}	4	500	..	..
	1,027	1,052	471	1,166

The irregularities in the table which prevail at different ages, to as late a period as the observations extend, prove that no law of the proportion of the sexes at birth can be traced by depending merely on the ages of the parents separately. If, however, 381 instances can be considered sufficient, the following table, drawn from that number of marriages in which the ages of both the peers and peeresses were recorded, will show that in proportion as the husband exceeded the wife in age, the number of male children was greater; and in proportion as the wife exceeded the husband in age, the number of female children was greater.

TABLE VI.—*Showing, in 381 First Marriages of Peers or Peeresses, the number of Male or Female Children born in proportion to the Difference of the Ages of the Parents at the time of Marriage.*

Difference of Age ; the Husband being	No. of Marriages.	Male Births to 1000 Female.	Female Births to 1000 Male.
Younger.....	54	865	1,156
Same age	18	947	1,055
Older, 1 to 6 years..	126	1,037	964
" 6 to 11 " ..	107	1,287	789
" 11 to 16 " ..	43	1,475	678
" 16 to 21 " ..	22	1,600	625
" 21 and upwards	11	1,667	600

The Author draws attention to the fact, exhibited in the above table, that "where the difference of age is from 1 to 6 years, the sexes may be justly regarded as being, in a natural point of view, cotemporary, and we there find the proportion of males and females born (1000 to 964) as that which seems to anticipate the excess of mortality in the former sex up to the nubile age so accurately, as to produce that balance of their numbers which, as before observed, is found to exist at that period. To preserve that balance, so essential to the preservation of the population, when the males habitually postpone marriage, it will be seen that the proportion of male births increases with the term of that postponement, and conformably to the law of mortality."

Mr. Sadler then gives a comparison of the diminution in the ratio of female births as compared with male, and shows that in the total it is almost exactly equivalent to the diminution in every five years in the proportion of males existing, by his Table of the Population of England in 1821, to a total population of 20,000 of both sexes. From his having taken the percentages on the diminishing numbers his table is not very clear, and I have therefore calculated the following comparison from the same data:—

TABLE VII.—*Showing that the Increase in the ratio of Male to Female Births, as the Age of the Husband exceeds that of the Wife, is equal to the Decrease in the existing Male population.*

Difference in Age. The Husband older by	Diminution in the ratio of Female Births every 5 years.	Husband's assumed Age on an average of 5 years.	Proportion of existing Males every 5 years.	Increase in the ratio of Male to Female Births.	Decrease in Male lives.
1 to 6 years	1,000	21	1,000		
6 to 11 "	819	26	806	181	194
11 to 16 "	703	31	725	297	275
16 to 21 "	648	36	665	352	335
21 and upwards	622	41	604	378	396
Average..	698		700	302	300

Assuming that the number of facts were sufficient for the average, and that no selection or arrangement of them was made to prove a foregone conclusion, this table exhibits a remarkable instance of the regularity with which the laws which govern our social existence are found to work. The increase in the number of males born is on the average represented as exactly equal to their diminished proportion to the other sex, which would result from

males deferring their average age of marrying to a later period of life, the average age of females at marriage being supposed to remain unaltered. Such important inquiries ought not, however, to rest on the few facts which have yet been collected. In the office of the Registrar-General of Births, Deaths, and Marriages much information no doubt exists, which it is to be hoped will be made public in some of his future able Reports, which we may justly call them if they resemble the past. The indefatigable industry and talents of Mr. Farr have already opened up to us in previous reports many novel subjects of the highest importance to society, and we may expect that the Report of the last Census, when it appears, will throw much additional light on the theory of population, and the circumstances which affect it.

Several other questions arise out of the series of tables we have considered, but they must be reserved for future discussion. The preceding Table VII. was constructed on the results of first marriages only. It is a remarkable fact, confirmed, as Mr. Sadler says, by all the observations he has been able to consult, that second and subsequent marriages invariably produce more females than males. The number of second and subsequent marriages in the Register of the Peerage, so often quoted, and in which the ages of both sexes could be ascertained, was 54, the male births being 117, the female 129. In 107 instances, in which the ages of either the father or the mother were known, he found that from the age of the widower being 22 to 27, at intervals of five years, up to the age of 67, the proportion of male to 1000 female births diminished from 913 to 750, the average being 797.

Another remarkable fact has been noticed, that in illegitimate connections the female births in every country are found to be in larger proportion to the male births than amongst children born in wedlock. Amongst other observations on this subject, may be quoted a table from Moser, whose admirable work, *Die Gesetze der Lebensdauer*, ought, like Quetelet's works, to be better known in England.

TABLE VIII.—*Showing the proportion of Male to 1000 Female Births, Legitimate and Illegitimate.*

	Legi- timate.	Illegi- timate.		Legi- timate.	Illegi- timate.
Prussia, 1820-34 ..	1,060	1,031	East Prussia & Posen	1,058	1,036
France	1,067	1,048	Paris	1,038	1,034
Naples, 1819-24.	1,045	1,037	Geneva, 1814-33 ..	1,090	1,015
Austria	1,062	1,043	Amsterdam	1,050	1,088
Wurtemberg	1,060	1,035	Leipzig	1,062	1,059
Sweden	1,047	1,031	Montpellier, 1772-92	1,071	1,008
Bohemia	1,057	1,004	Frankfort-on-Maine	1,028	1,078
Westphalia, 1809-11	1,047	1,004			

Mr. Sadler, in accordance with the theory deduced from his observations, naturally explains this fact by considering that, as such connections take place at earlier ages than lawful unions, the males are more nearly of the same age with the females; which is somewhat confirmed by M. Quetelet's conclusions, that the maximum of marriages does not occur till after men have passed what he calls the age of violent passions. But M. Bernoulli, in a short but able article in the *Annales d'Hygiène* for 1838, argues that the conceptions may be in the same proportion of the sexes, whether the parents are married or not; but that from the anxiety of the mother to hide her shame, the means to ensure premature delivery are frequently resorted to, and that from the known liability of male children to perish rather than females, a fewer number survive in such cases; and further, that the mother, being more desirous that her male offspring should not be considered illegitimate than her female, would be very likely to conceal the fact either by not inscribing its name on the register, or by causing it to pass as the fruit of a marriage, or by persuading the father to contract a marriage with her. If even 2 women out of 100 succeed in any of these objects with regard to the male offspring, the number of male to female births would be reduced from 105 to 103 males in proportion to 100 females.

In all future inquiries, it is evident that the mean duration of marriage, or the joint existence of a male and female life, as given by Mr. Farr—or rather, I should say, the term of this joint duration which ends with the average age at which females cease to be child-bearing—must be a principal element in the calculation. The average period of child-bearing is not more than 30 years, and may, for the sake of limiting the term of inquiry, from the date of marriage, be taken to terminate with age 45 on the side of

the female. On the side of the male the period may extend for 20 years longer, which accounts for the fact of there being more second marriages of males than of females.

It is a wise provision of nature, that in countries where the period of female prolificness commences at an early age it terminates much earlier in proportion, or the constitution of the mother might be exhausted, and the children of later life be born only to die of debility and disease.

Of all these speculations, by far the most important is that of Mr. Sadler. The law which he deduces from the facts recorded is at once simple, and in accordance with all the operations of nature. It is evident that if marriages are deferred to a much later period of life on the part of the male than that at which the number living of the sexes are equally proportioned, that a large number of the male population must have died in the interval; and, consequently, in a country in which polygamy on the part of either sex does not prevail, many females would be left unmarried. If the children from these marriages were born in equal proportion of the sexes, and the same law of marriage continued to prevail, a still smaller proportion of marriages would take place in the second generation, and by degrees the whole population would become extinct. The same result would take place if the female population married much later than the period at which the sexes are equal. But the proportion of male or female births, exceeding as the male or female exceeds in age, does in a manner almost unnoticed restore the equality of the sexes, and preserves the race from extinction. Of course, the same result would be arrived at by the proportion of the sexes being made equal at any other age than is now generally found to be the case in all countries; but such a change would involve a total alteration in the constitution of man, and the period when the sexes relatively arrive at maturity; and the working of natural laws in unusual circumstances is generally found to be such as brings about the needful results with the least violence to their usual operation. If the law deduced from the few observations hitherto recorded be confirmed on more extensive inquiries, it will be an additional proof that all the actions and qualities of man, physical as well as mental and moral, are, unconsciously to him, subservient to general laws, which adapt themselves to act to the same great end, in spite of all opposition and all the changes or caprice of society, and tend to preserve, as well as to regulate, his social existence.